REMARKS

Summary of Office Action

In the Office Action of September 18, 2006 the Examiner rejected claims 1, 14-15, and 24-25 under 35 U.S.C. §102(b) as being anticipated by Hoffman (U.S. Patent Application Publication No. 2002/0120207). The Examiner rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over Erbel (U.S. Patent Application Publication No. 2002/0115923) in view of Hoffman and further in view of Corn (U.S. Patent 6,062,216). The Examiner next rejected claim 13 under 35 U.S.C. §103(a) as being unpatentable over Hoffman in view of Corn. Claims 26 and 27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Erbel in view of Hoffman. The Examiner further indicated that claims 2-11 and 16-23 would be allowable if rewritten in independent form. Applicant appreciates this indication of allowability.

Amendment to Specification

Applicant has amended paragraph [0004] of the Specification to populate the blank space in the application as originally filed with reference to the serial number and filing date of the application referred to therein. No new matter has been added.

Amendment to the Claims

Applicant has amended allowed claim 2 to incorporate the subject matter of claim 1 from which claim 2 previously depended. Accordingly, claim 2 is in independent form and is believed to be in condition for allowance. Furthermore, as claims 3 and 4 depend from claim 2, these claims are also believed to be in condition for allowance.

Applicant has also amended allowed claim 5 to incorporate the subject matter of claim 1. Accordingly, claims 5, and the claims that depend therefrom, are also believed to be in condition for allowance. Claim 1 is hereby cancelled.

Applicant has also amended allowed claims 16 and 19 to incorporate the subject matter of claim 15 from which these claims previously depended. Claims 24 and 25 have also been amended to correct the dependency of these claims. Claim 15 is hereby cancelled. Accordingly, Applicant believes claims 16-25 are also in condition for allowance.

Prior art rejections of remaining claims

The Examiner rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over Erbel in view of Hoffman and further in view of Corn stating that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have made the method of Erbel '923 and monitor the patient's breathing by monitoring breath flow with a spirometer, chest movement with a displacement sensor, and combining the signals to create a corrected respiration signal, as taught by Hoffman '207, in order to obtain a more accurate representation of the breathing signal, and further obtained the chest displacement signal using a laser sensor, as taught by Corn '216, in order to obtain an accurate chest displacement signal." Applicant respectfully disagrees.

Claim 12 calls for, in part, a calibration circuit for receiving an air flow signal from a spirometer and a chest displacement signal from a laser displacement sensor to provide a corrected respiration signal combining information from both the air flow signal and the chest displacement signal. That is, the respiration monitoring system of claim 12 generates a corrected respiration signal through the combining of the information acquired with the spirometer and the laser displacement sensor. Claim 12 further calls for a controllable radiation source receiving the corrected respiration signal to control radiation delivered to a patient according to the corrected respiration signal. The information acquired by the spirometer and the laser displacement signal is combined to correct the respiration signal acquired with either of the respiration monitoring devices, i.e. the spirometer or the laser sensor. The art of record fails to teach or suggest such a system.

As stated in Erbel, "in many medical practices, it would therefore be advantageous to be able to detect the patient's breathing precisely, in order for example to be able to track the position of organs or tumors affected by breathing." Erbel, paragraph [0006]. Erbel further states that "for this purpose, methods have already been developed for detecting changes in external parameters of the patient, so allowing the patient's breathing to be detected" and that "the patient's breathing can also be tracked by spirometry ." Erbel continues stating that "the problem with these solutions, however, is that breathing can only be tracked as long as the patient remains in contact with the

system." That is, Erbel teaches that it is undersirable to monitor respiration with a spirometer because the patient must be physically connected to the respiration monitoring system. Erbel clearly teaches away from the utilization of a spirometer to provide an airflow signal as called for in claim 12.

The Examiner further asserts that Hoffman discloses "combining the two signals to provide a corrected respiration signal (paragraphs [0066], [0069], [0080]), in order to obtain a more accurate representation of the breathing signal." Contrary to this assertion, Hoffman does not teach or suggest combining the two signals to obtain a "more accurate representation of the breathing signal" but teaches the comparison of the two signals to establish a diagnosis or measure of an airway obstruction as shown in Fig. 1. That is, there is no combination of the respiration information to generate a corrected respiration signal as called for in claim 12 rather; Hoffman teaches acquiring an effort measurement 110 and a flow measurement 210 to determine a measure of airway obstruction 410. The information acquired with an external flow sensor 100 and an effort sensor 200 are compared, not combined, and provide a measure of airway obstruction, not a corrected respiration signal as called for in claim 12. There is simply no disclosure in the art or record, or the combination thereof, for combining a spirometer signal with a chest displacement signal as called for in the present claims.

Hoffman discloses dynamically comparing effort and flow signals using digital point by point comparisons through each breath. Hoffman states that "the resultant signal 410 of the comparison provides a measure of the respiratory function of the subject." Paragraph [0069] (emphasis added). That is, Hoffman does not include a calibration circuit for receiving the airflow signal and the chest displacement signal to provide a corrected respiration signal that is generated by combining the underlying information from both the airflow signal and the chest displacement signal.

Furthermore, although Corn discloses a generally noninvasive sleep apnea detector system, there is simply no motivation to combine the remote laser respiration detection system of Corn with either of the systems of Hoffman or Erbel. That is, both Erbel and Hoffman include their own respective respiration monitoring systems. Neither of these references discloses the generation of a corrected respiration signal through

combining information from an airflow signal and the chest displacement signal. That is, Hoffman requires of the flow measurements and effort measurements in order to generate a measure of airway obstruction as shown in figure 1. There is no generation of a corrected respiration signal as called for in claim 12. Furthermore, as argued above, Erbel teaches away from the use of a spirometer for generating an airflow signal as called for in claim 12 in teaching a system that remotely monitors respiration performance. Accordingly, at least for the reasons set forth above, Applicant believes that which is called for in claim 12 is patently distinct over the art of record.

The Examiner rejected claim 13 under 35 U.S.C. §103(a) as being unpatentable over Hoffman in view of Corn. Applicant has amended claim 13, to clarify and further define that which is called for therein. As amended, claim 13 further defines that the medical imaging system includes an imager for receiving the corrected respiration signal and acquiring component image signals from internal anatomy of a patient over different phases of respiration and mathematically combining the component image signals according to phases of respiration when the component image signals were acquired to produce a composite image of the internal anatomy. As stated in paragraph [0004] of the Specification, "in imaging, an accurate knowledge of respiration phase may be used to properly assembly x-ray tomographic or magnetic resonance imaging components acquired during breathing into an image free of image artifacts." This paragraph of the Specification further describes the use of the respiration monitoring system to correctly align a radiation beam with a correct tissue. Accordingly, no new matter has been added.

Hoffman discloses a system that visually monitors the relative positions of the external markers associated with respiratory function. As stated in paragraph [0108], Hoffman states that "an optoelectric plethysmography system analyzes the movement of a retro-reflective markers using television cameras connected to an automatic motion analyzer." Hoffman continues, "the plurality of markers are simultaneously visible to at least two television cameras so that their three-dimensional positions and displacements can be constructed using stereo-photogrammetric methods." That is, the system of Hoffman monitors the relative position of for example, the upper thorax, the lower thorax and the abdomen. This monitoring generally corresponds to measuring the effort

associated with the respiratory function. That is, the entirety of the system of Hoffman is directed to respiration monitoring and is not related to medical imaging as called for in claim 13. As generally understood, medical imaging systems include those imaging devices in the category which generally includes CT, MRI, PET, x-ray and the like type devices configured to monitor internal anatomy of a patient. Although Erbel discloses a method of determining respiration performance associated with a method for assisting radiation therapy, as argued above with respect to claim 12, Erbel teaches away from the use of a spirometer for respiration monitoring in teaching remote respiration monitoring.

Similarly, Corn teaches away from the incorporation of a spirometer in teaching an apnea detector that includes a wireless respiration monitoring system. Like Erbel, Corn states that "it is desirable that a sleep apnea monitor be non-invasive, and, if attached to the patient, that it employs sensing units which are not subject to entanglement or constriction and further pose no hazard of laceration, suffocation, or electrocution." That is, because the system of Corn is a sleep apnea detector, Corn recognizes that connecting a respiration monitoring system such as a spirometer to a sleeping patient could be more detrimental than the medical condition the system is designed to address, i.e. sleeping respiration. Accordingly, at least for the reasons set forth above, Applicant also believes that which is called for in claim 13 is patently distinct thereover.

The Examiner also rejected claims 26 and 27 under 35 U.S.C. §103(a) as being unpatentable over Erbel in view of Hoffman. As argued about with respect to claim 12, Erbel teaches away from the use of a spirometer to measure respiration performance. Furthermore, Hoffman does not teach the generation of a corrected respiration signal as called for in claims 26 and 27. Simply, Hoffman is directed to a respiration monitoring system and includes a spirometer constructed to generate data and a respiratory plethysmograph that utilizes chest and abdomen bands to determine a physiologic respiratory performance. The spirometer and the plethysmograph information are compared rather than combined to determine a measure of airway obstruction rather than generate a corrected respiration signal as called for in claims 26 and 27. Simply, the system of Hoffman requires both signals and generates a measure of airway obstruction

signal 410 as shown in Fig. 1 associated with the respective physiological performance of the effort measurements 110 and the flow measurements 210. Hoffman does not disclose a system that combines the respective respiration information to generate a corrected respiration signal as disclosed in the above-captioned application. Accordingly, at least for the reasons set forth above, Applicant believes claims 26 and 27 are also patently distinct over the art of record.

Therefore, at least for the reasons set forth above, Applicant believes claims 2-14 and 16-27 are patently distinct over the other record and in condition for allowance. Accordingly, Applicant respectfully requests a notice of allowance of these claims. Although no fees are believed payable with this submission, the Office is hereby authorized to charge deposit account number 50-1170 for any fees which may be deemed necessary. The Examiner is cordially invited to contact the undersigned, should any matters remain unresolved, which would prevent the passage of the above-captioned matter to issuance.

Respectfully submitted,

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